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ABSTRACT

Developmentalists are convinced that within each young child a process of unfolding occurs to regulate learning in ways that make worksheets and the "force-feeding" of isolated skills inappropriate. Still, worksheets are enormously popular in early education, and math education assumes that number is learned through internalization. Why do such antiquated educational practices and assumptions remain popular? Although several factors contribute to neglect of the developmental perspective, early childhood educators can contribute significantly to improving the situation by precisely and scientifically criticizing inadequate educational practices and by advancing scientifically based alternatives. Piagetian theory can aid such efforts because Piagetian research demonstrates a constructivist principle according to which each child builds his or her own knowledge from the inside, through mental activity and in interaction with the environment. Investigations illuminating children's construction of knowledge of language and arithmetic have been made; such studies reveal inadequacies of the common sense approach to education. For example, many children who can write "8" next to a picture of eight ice-cream cones continue to believe that eight chips spread out are more than eight chips pushed close together. From an historical perspective, educators' acceptance of practices based on behaviorism, associationism, and psychometric tests constitutes educational progress. However, such approaches deal with surface phenomena and provide common sense explanations. Piagetian theory goes beyond to encompass behaviorism. (RH)

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Can There Be Excellence in Education Without Knowledge of Child Development?*

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If we were asked whether excellence is possible in education without knowledge of child development, most of us would answer, "Of course not." However, many programs like the Chicago Mastery Learning Program are thriving from coast to coast as if educators had never heard of child development. The question I would like to discuss today is why the child-development philosophy is not winning the battle against worksheets and the force-feeding of the 3 R's in classrooms for four-, five-, six-, and seven-year-old children.

My answer to this question is that to most educators in power, especially administrators, who make decisions in education, child development seems softheaded and without relevance to instruction.

Let me clarify first what is generally understood by the term "development." To most people, development means a long-term process of unfolding or maturation from inside the child, like the unfolding of a flower that develops out of a bud. This maturation is often understood as an essentially passive process which neither the teacher nor the learner can do much about.

Child development has the disadvantage of being a loosely related field in psychology consisting of a variety of theories about the child that are not directly applicable to education. For example, Sigmund and Anna Freud are big names in child development, and so are Erik Erikson and Jane Loevinger. But their theories cannot be applied to instruction because they do not deal with children's cognitive development, and social and emotional development is only indirectly related to the 3 R's and other academic subjects. The work of Arnold Gesell, Urie Bronfenbrenner, and L. S. Vygotsky comes closer to education because it deals with children's cognitive development. However, their ideas are too diverse to unite into a theory of instruction, and each is too sketchy when we try to select one of them for curriculum development.

I have so far spoken about child development as an area of psychology. When early childhood educators speak of child development as a philosophy or an approach to education, they make a leap from psychological theories to educational practices, without precise theoretical links between them. In medicine, if a symptom is found to be caused by vitamin deficiency, for example, the objective of the practitioner is defined as the removal of the cause. In early childhood education, however, if we look in any textbook written in the child-development tradition, we do not find objectives based on any explanatory theory and find, instead, vague and broad goals such as emotional, social, and intellectual development and more specific objectives defined along traditional academic subjects such as language arts, math, and science. With these objectives defined without foundation in an explanatory theory, it is not suprising to find a variety of activities

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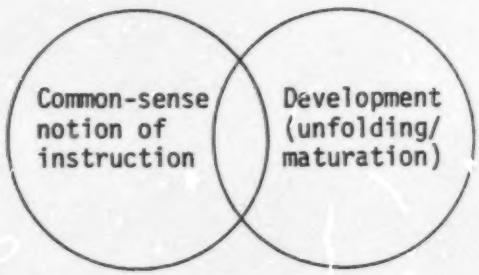
equally without precise theoretical links to an explanatory theory, such as pretend play, painting, block building, water play and singing.

For centuries, education has been based on mere common sense, trial and error, and opinions called philosophies, such as Rousseau and Dewey's philosophies. When some educators attempted to introduce a scientific foundation into the profession, they found associationism, behaviorism, and psychometric tests. Behaviorism, a more intense and systematic version of associationism, is a scientific theory that has been confirmed all over the world, and psychometric tests yeild numbers and printouts that give the impression of being scientific. If we want to win the battle against worksheets and the force-feeding of the 3 R's in early childhood education, we have to have a scientific theory that is strong enough to disprove associationism, behaviorism, and the desirability of psychometric tests.

I would like to back up and focus more sharply on common sense. According to common sense, teaching consists of telling or presenting knowledge, and learning takes place by the internalization of what is taught. When proponents of child-development methods speak of unfolding or maturation, these ideas appear in an almost mutually exclusive relationship with the common-sense notion of instruction as can be seen in the following figure:



To people who think in common-sensical and either-or terms, this relationship implies that the developmental viewpoint necessitates giving up instruction, which they want to intensify in going back to "basics." Behaviorism, associationism, and psychometric tests are compatible with common sense because they grew out of common sense. Behaviorists intensified and systematized associationism by breaking "correct" behaviors, or answers, down to small components and sequencing them to insure better internalization. Psychometric tests approached evaluation in a similar way, by focusing on "correct" behaviors, or answers, thereby reinforcing the common-sense notion that the child who has acquired more knowledge is the one who can give more correct answers. Now that the common-sense notion of teaching has thus been buttressed by behaviorism, associationism, and psychometric tests, it is even harder for the Establishment to accept the child-development philosophy.

Developmentalists are convinced that there is a process of unfolding from inside the child, and that the force-feeding of isolated skills with worksheets is inappropriate for young children. But we need to go beyond saying that worksheets are developmentally inappropriate and explain

precisely and scientifically why these are inappropriate. We must also go beyond criticizing the undesirable, and advance alternative ways to replace what we criticize. I would now like to show how Piaget's theory can help us accomplish both of these tasks.

Let me give an example from Emilia Ferreiro's (1978; Ferreiro and Teberosky, 1982) research in reading and writing to show the kind of precise scientific explanation that is possible to present against associationists and behaviorists. Ferreiro was a collaborator of Piaget in Geneva until she returned to her native land, Argentina, where she did her research in Spanish. She interviewed four-to-six-year-old children before they received any instruction in school in reading. She told them, for example, that she was going to write "Daddy kicks the ball" ("Papá patea la pelota") and wrote "PAPA PATEA LA PELOTA" in front of the child. She then asked each child if he thought she had written "papá" somewhere. The children at the lowest of the six levels she found usually pointed to the first word in response. She then asked if "patea" ("kicks") was written somewhere, and the children in this lowest group answered, "No, it doesn't say 'patea' anywhere." She then asked if "la pelota" ("the ball") was written somewhere, and the children often pointed to the second word, "PATEA." In other words, according to these children, the entire sentence said, "Papá petea la pelota," but only the nouns were written, that is, only the objects were represented explicitly in the text.

Ferreiro went on to ask what the rest of the text said if

"Papá" "la pelota"

PAPA PATEA LA PELOTA.

Some children replied, "the football field," and others said, "the goal" or "Mummy." For these children, a written sentence was like a picture. When young children draw a house, they often draw other objects in the background, such as flowers and the sun. When they think of Daddy kicking a ball, they likewise think of the football field, the goal, or Mummy watching Daddy. Note that even at this low developmental level, children believe that writing has meaning. They thus begin with meaning, and not with letter sounds such as "b-b-b-b-b" and "t-t-t-t-t." Note also that children construct new knowledge out of what they already know. They already know how to represent things with pictures, and knowledge of representation with writing develops by differenciation out of their knowledge of pictures.

Ferreiro found the next developmental level in children who thought verbs were written, but not as separate units. For these children, "Daddy" was one spoken unit, and "kickstheball" was another. A third level she found was in children who thought the verb "kicks" was a unit, but that "theball" was one inseparable spoken unit. At the highest level she found, children differentiated the article from the noun, and once they could make four separate units out of their speech, they could guess what each word "said" by making a one-to-one correspondence between their own speech and the segments on the paper.

When children can guess what each written segment must "say," it is much easier for them to make correspondences between spoken syllables and written

squiggles than when they are at the level of believing that verbs cannot be written. Imagine being taught to read verbs like "sit," "sat," and "set" when you don't believe that verbs can be written! When children later believe that "kickstheball" is a unit, being told that it is three units likewise puts them in conflict with what they honestly think. The force-feeding of phonics can produce learning, but premature force-feeding is not good for the development of children's initiative, confidence, or motivation to go on reading. In the early teaching of phonics, furthermore, children are taught, in essence, to forget about meaning, when they already believe that writing has meaning. We later find many children who can decode words but do not get meaning out of this activity. These children are often given remedial reading, in which "comprehension skills" are taught! Educators ought to be ashamed of giving remedial reading because remedial reading means that a remedy is necessary to correct the result of the bad teaching that caused the problem.

In the March issue of Young Children, I expect to see an article I wrote with Mary Kay Willert (Willert and Kamii, 1985), a teacher of five- and six-year-old children who used to teach in Chicago and refused to teaching reading directly through phonics instruction. Instead of teaching phonics, she worked very hard at fostering children's autonomy, curiosity, and initiative (Kamii, 1984). When one child called Benny became interested in reading, he constantly asked her what the writing "said" on people's T shirts and in recipes, books, and signs. The passion with which he pursued reading and writing was similar to the "binges" and intensity documented by developmentalists outside the Piagetian framework such as Durkin (1966) and Bissex (1980). In indirect, constructivist teaching, the teacher works on children's curiosity and motivation to know, and when the child wants to know something, she intervenes to supply the elements he wants. Telling a child how to write "No spitting" when he wants to know is very different from giving him a lesson on the "N" sound or the "S" sound without a meaningful context.

I just received the February issue of Language Arts in which I contributed another article with Marie Randazzo, who is in this audience (Kamii and Randazzo, 1985), a teacher who got five- and six-year-old children at the University of Illinois Children's Center to exchange ideas about how to spell words. In trying to write "store," for example, the writer-leader wrote "S" and asked the rest of the group what to write next. One child said, "T," and another continued with "O and then R!" With "STOR" on the board, the leader asked, "Then what?" Child 2 replied, "That's all," but a third child, who knew how to read, yelled, "E." Child 2 then retorted by insisting, "No, there is no 'E' in it." Knowing who could read and who couldn't, the leader added an "E" at the end. A fourth child, who had been silent up to this point, then announced, "Now, it says 'story'."

This way of teaching is a Piagetian extension of what psycholinguists call "invented spelling." Independently of Piaget's theory, psycholinguists showed 20 years ago that chidlren learn to talk by making their own rules from within, and not by merely internalizing external models. Brown and Fraser (1963) showed, for example, that when a two-year-old was asked to repeat the sentence "I can see a cow," she said, "See cow," and when she was asked to repeat the sentence "I will read the book," she said, "Read

book." Note that even when an external model is explicitly supplied, children do not directly internalize the knowledge given by the environment. Psycholinguists also showed more then 10 years ago that children learn to spell by making their own rules from within, and not by having the letter "A" poured into their heads, then "B," and "C," etc., in a neat sequence, as if children were empty vessels. Psycholinguists' careful research of "invented spelling" is very impressive, and it is amazing that phonics lessons go on throughout the country, as if Frank Smith (1982), Charles Read (1971, 1975), Carol Chomsky (1971, 1979), and Edmund Henderson and James Beers (1980) had never written anything!

Piaget's theory is more useful for education than any other theory of child development for two reasons. First, he is the only person who studied children's development of knowledge in great detail, including mathematics, logic, science, and social studies, and knowledge, after all, is the main business of schools. Second, his theory called constructivism is solidly scientific, and has been verified by cross-cultural research all over the world.

Constructivism is the theory according to which each child builds his own knowledge from the inside, through his own mental activity, in interaction with the environment. Constructivism disproved empiricism, according to which children acquire knowledge from the environment by internalizing it, or absorbing it. Examples of children's construction of knowledge can be seen in Emilia Ferreiro's research. No one teaches children that verbs are not written. But young children construct this interpretation by thinking about the squiggles they see in their environment. Likewise, no one tells children that "Daddy" is a unit, and that "kickstheball" is another. Yet, children think about the language they hear and construct the idea for themselves that in a statement, there are two parts--a topic and a comment. They later go on to construct three parts and then four out of "Daddykickstheball" as we saw earlier. Even when we try to get children to imitate sentences like "I will read a book," to cite another example, they produce their own versions such as "Read book" and "See cow" that are based on the rule they have constructed at their own level.

I would like to go on to the teaching of arithmetic. A typical worksheet gets children to write "3" next to a picture of three cookies, and "4" next to a picture of four Coke bottles. Children who can do these worksheets already know how to do them, and do not learn number concepts by completing them. Those who cannot do them, on the other hand, will not learn number concepts by filling out worksheets. Number is something children construct by thinking, in their heads, and not by pushing pencils.

I would like to clarify children's construction of number by discussing a Piagetian task (Inhelder and Piaget, 1963). The child is given a glass, and the researcher takes an identical glass. The adult then asks the child to drop a bead into his glass each time she drops one into hers. After about six beads have thus been dropped in each glass with one-to-one correspondence, the adult says, "Let's stop now, and I want you to watch what I am going to do." The research then drops one bead into her glass and suggests, "Let's get going again." Each person drops about six more beads into his or her glass with one-to-one correspondence, and the child is asked

whether the two people have the same amount, or the child has more, or the adult has more.

Four-year-olds usually say that the two glasses have the same amount, and when asked "How do you know?" they explain, "Because I can see they both have the same." Upon being asked to describe how the beads were dropped, they can usually give all the empirical facts correctly (". . . Then you told me to stop, and you put one in your glass . . . . Only you put an extra one in your glass, and I watched 'cause you told me to wait. . . Then we got going again. . .").

By age five or six, however, the majority of children can deduce logically that the experimenter has one more. When we asked them what will happen "if we continued to drop beads in the same way all afternoon," only some of them reply that the adult will always have one more. Others make empirical statements such as "I don't know because we haven't done it yet" or "We don't have enough beads to keep going all afternoon."

The logical nature of number can be clarified by understanding the distinction Piaget made among three kinds of knowledge according to their ultimate sources: physical knowledge, logico-mathematical knowledge, and social (conventional) knowledge. Physical knowledge is knowledge of objects in external reality. The color and weight of a bead are examples of physical properties that are in objects in external reality, and can be known by observation. The knowledge that a bead will go down when we let go of it is also an example of physical, empirical knowledge.

Logico-mathematical knowledge, on the other hand, consists of relationships constructed by each individual. For instance, when we are presented with a red bead and a blue one, and think that they are different, this difference is an example of logico-mathematical knowledge. The beads are indeed observable, but the difference between them is not. The difference is a relationship created mentally by the individual who puts the two objects into this relationship. The difference is neither in the red bead nor in the blue one, and if a person did not put the objects into this relationship, the difference would not exist for him. Other examples of relationships the individual can create between the two beads are "similar," "the same in weight," and "two."

The ultimate source of social knowledge is conventions made by people. Examples of social knowledge are the fact that Christmas comes on December 25, that a bead is called "bead," and that grown-ups sometimes greet each other by shaking hands.

You can see that the spoken words "one, two, three, four . . ." and written numerals belong to social knowledge and representation, which are the most superficial parts of arithmetic. The underlying number concepts belong to logico-mathematical knowledge, which has its source in each child's head. The bad news from Piaget's theory is that number concepts are not teachable, as they can be constructed only by the child, through his own mental activity. The good news, however, is that we don't have to teach number concepts because children will invent them on their own,

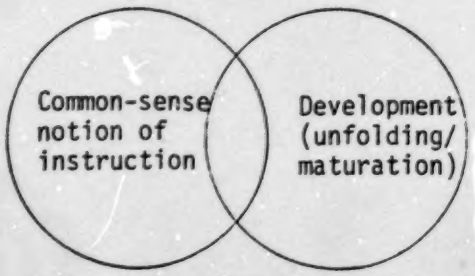
even in primitive cultures like the innermost part of Australia that has not been touched by modern technology.

It is amazing to me that all of math education is based on the empiricist, wrong assumption that number is something that has to be learned by internalization from the environment. Piaget (Piaget and Szeminska, 1941) showed more than 40 years ago that number concepts are constructed by each child, but math education is still going on as if Piaget had never published The Child's Conception of Number and many other volumes.

Based on his theory, I did an experiment in first grade arithmetic with a teacher who is in this audience, Georgia DeClark, who used to teach in Glen Ellyn. We eliminated all worksheets from first grade arithmetic and used instead two kinds of activities that emphasized thinking: (a) situations in daily living such as the counting of votes and (b) group games such as dice and card games. I will not go into the details of this study, since Georgia is giving a presentation about it and a book has been published entitled Young Children Reinvent Arithmetic (Kamii, 1985). I would simply like to make one point from this research, that worksheets are harmful for first grader's development of arithmetic.

One of my reasons for saying this is that worksheets require children to write answers, and having to write interferes with children's possibility of remembering combinations such as "3, 2, and 5" and "4, 2, and 6." Children can remember sums better when they are free to concentrate on these combinations, without having to think about how to write "5," "6," "7," etc. My second reason for saying that worksheets are harmful is that they teach children to count mechanically when they don't know a sum. In extending my research into second and third grades, I am amazed that the great majority of second graders are still counting on fingers to do sums such as 5 + 6, and this need to count persists in the third grade. The first graders Georgia and I had used their heads instead and said, "5 + 5 = 10; so 5 + 6 has to be 11," but the children who were taught with worksheets in first grade became counting machines. Since they were required to write answers to satisfy the teacher, they used the most mechanical, surest, deadly technique they were taught to be able to write the answer. Children who use us mindlessly engaged in counting repeat the same mechanical procedure even if 7 + 2 is followed immediately by 2 + 7, or 6 + 4 is followed immediately by 7 + 4.

I would like to return to the figure I showed you earlier to point out that constructivist teaching is not maturationist.



Piaget clearly differentiated maturation, which is a biological process like the baby's becoming able to walk, from the construction of knowledge through the child's own mental activity. A more precise way to talk about this mental activity is to say that children construct knowledge by putting things into relationships. For example, the two-year-old who said "Read book" when she was asked to repeat "I will read a book" had constructed the rule of choosing the most important words when there were too many for her. Children make relationships when they choose the two most informative words. Knoweldge is thus constructed through an active mental process that is far from the maturationist view represented by the Gesellian school.

Constructivist teaching uses children's intrinsic motivation to think, or to put things into relationships. Mary Kay Willert developed children's curiosity and initiative to ask questions. Marie Randazzo encouraged children to discuss how they thought words should be spelled when they wanted to know how to write them. Georgia DeClark created situations that motivated children to think numerically. Note that there is a world of difference between children's autonomous thinking and the requiring of "right" answers on worksheets.

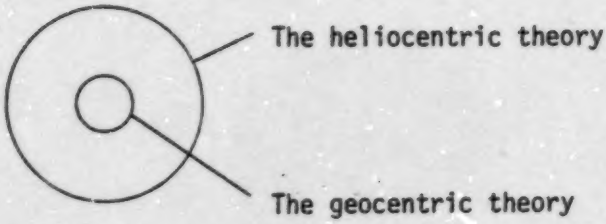
Worksheets are enormously popular in early childhood education, and we must ask why they are so widely used. One reason is that they give the illusion of teaching for one clear objective after another in a well-planned sequence. The second reason for the popularity of worksheets is that many parents and supervisors like them on the basis of mere common sense. The third reason is that worksheets keep children quiet, and the teacher does not have to think to decide what materials to prepare for the next day or how to interact with children from one moment to the next.

The 3 R's are often called the "basics" and "academic skills," but these are misnomers. The 3 R's are the most superficial, conventional aspects of representation. Teaching the 3 R's in early childhood education is like trying to put the icing on a cake before it has even been baked. Letters and numerals are valued by common sense because they are the most obvious, superficial, observable parts of knowledge accessible to common sense. Knowledge and thinking are not directly observable, and those are the more basic academic contents we ought to be worried about.

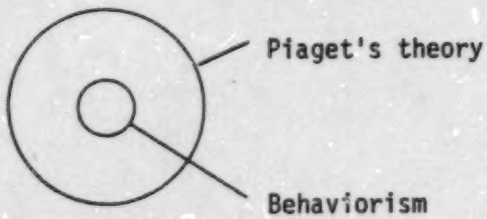
You must have noted that Piaget's scientific theory about how children learn is very different from behaviorism, which is another scientific theory about how children learn. Why is it that two scientific theories can be so diametrically opposed?

The answer is that the same relationship can be found in every other scientific field such as astronomy. While the heliocentric theory disproved the geocentric theory, according to which the sun revolved around the earth, the new theory did not eliminate the old one. The new theory went beyond the old one by encompassing it as can be seen in the figure on the next page.

The proof is that even today, we still talk about the sunrise and sunset, even though no one believes in the geocentric theory any more. It is still true that the sun rises and sets, when we limit ourselves to a certain perspective.



The relationship between Piaget's theory and behaviorism is similar as can be seen in the following figure:



Piaget's theory went beyond behaviorism by encompassing it. Therefore, the new theory can explain the phenomena explained by behaviorism, but the converse is not true. Piaget explained conditioning as an instance of organisms' adaptation to the environment. Worms, rats, and dogs, as well as human beings, adapt to rewards and punishments. But human beings are more complicated than dogs, and behaviorism cannot explain human knowledge.

Piaget's constructivism thus did not eliminate behaviorism. This is why behaviorism remains scientifically true as long as we limit ourselves to surface, observable behaviors. If we view learning only as a change in behavior, we can define our objectives behaviorally and use rewards and/or punishments to modify it. The results of such teaching are often higher test scores because psychometric tests in early childhood education are made to evaluate surface skills such as children's ability to count and to recognize numerals. But this kind of teaching is like reducing a patient's temperature by giving aspirin. Aspirin works on symptoms, but not on the underlying cause of the illness. Many children who can write "8" next to a picture of eight ice-cream cones continue to believe that eight chips spread out are more then eight chips pushed close together.

I would like to say one more thing about Piaget's theory in relation to behaviorism and associationism. All sciences begin by studying surface, observable, and limited phenomena, and by explaining them with mere common sense. In astronomy, the geocentric theory came first and was a surface, common-sensical interpretation of the apparent movement of the sun. It is not surprising that psychologists, too, began by studying behavior, which is observable and easier to study then complicated topics such as human knowledge and morality. Rewards and/or punishments make good common sense, but the time has come for educators to go beyond mere common sense. It is very hard to give up common sense, and this is why it took humanity about 150 years to accept the heliocentric theory (Taylor, 1949).

I hate to say this to this audience, but I think educators' acceptance of behaviorism, associationism, and/or psychometric tests constitutes

progress in our profession. I say "progress" because it was a big step forward for education to go beyond the primitive stage of making decisions based only on tradition, common sense, and opinions called "philosophies." Other professions such as medicine, engineering, and architecture have long had a scientific foundation, but education was entirely in a prescientific stage until it accepted associationism, behaviorism, and psychometric tests.

One of the major points of constructivism is that each child has to develop by going through one level after another of being "wrong." To take an example from Emilia Ferreiro's research again, the child has to go through the level of thinking that "Daddykickstheball" consists of two parts before becoming able to think that it consists of three parts, and he has to go through this level before becoming able to think that the statement consists of four parts. Science, too, develops by going through one level after another of being "wrong." The geocentric theory was wrong, but it was a necessary stage without which the heliocentric theory could not have been invented. The heliocentric theory was thus a great achievement, but Kepler later proved Copernicus wrong when he found the planets to move in elliptical orbits rather than circular ones.

Behaviorism was likewise a necessary stage in the history of psychology, and many psychologists are already saying that behaviorism is dead. I have seen many people change from behaviorism and associationism to Piaget's theory as I did, but I have never heard of a Piagetian who later became a behaviorist. Psychometric tests, too, are a stage that psychology is bound to go beyond. Speaking of intelligence tests, Piaget (1965) said 20 years ago, "either we shall one day find good tests, or else intelligence tests will go into history as an example of a fruitful error (p. 150)."

I have no doubt about the eventual victory of the developmental point of view simply because science does not stand still and human intelligence does not stay permanently satisfied with low-level knowledge. But victory will not happen all by itself, without considerable efforts on our part.

As I said earlier, the rigorous conceptualization of objectives based on a scientific, explanatory theory is what I have not found in a single book written in the child-development tradition. Physicians know whether their objective is to alleviate only the symptom or to remove the underlying cause of a disease. But educators do not define their objectives with such scientific rigor. We must first be clear about how knowledge develops because without an explanatory theory about how children construct knowledge, it is impossible to conceptualize specific objectives in relation to long-term goals such as intellectual, social, emotional, and moral development.

Only after defining valid objectives does it make sense to debate whether play is superior to worksheets to achieve these goals. Some kinds of play are more educational then others, and the same kind of play, such as Musical Chairs, is educational only at a certain level of intellectual development. I will not go into the details of these activities, since these have already been published in "Piaget for Early Education" (Kamii and DeVries, 1977), Physical Knowledge in Preschool Education (Kamii and Devries, 1978), Group Games in Early Education (Kamii and Devries, 1980), Number in Preschool and Kindergarten (Kamii, 1982), and Young Children Reinvent Arithmetic (Kamii, 1985).

The philosophy of child development may be correct, but we must go beyond philosophies or opinions if we want to stop being dictated by other philosophies or opinions. I, therefore, plead for educators to construct the next stage of our profession from within by studying Piaget's theory about how human beings construct knowledge and moral values. It is easy to complain about the simple-mindedness of tests and the naivety of the Chicago Mastery Learning Program. But we must be willing to go beyond complaining and study children's development of knowledge in the same rigorous way physicians study physiology and pathology, and engineers study mathematics and physics.

The public knows that today's medicine and engineering are not the same thing as what existed 30 or 40 years ago because it knows that science does not stand still. While the public does not tell physicians and engineers to go back to the "basics" of 40 years ago, it proudly tells us to go back to . . . I don't even know when. The reason is that politicians and the public honestly believe that there is little more to education than common sense, and that their common sense is as good as educators'. Politicians and the public also believe that what was good enough for them 40 years ago is good enough for the children of today because the changes they have seen in education have only made things worse than the good, old days. The recommendations for "excellence" are based on mere common sense, and it is not by lengthening the school day or the school year, giving more homework, pushing the 3 R's down to kindergarten, and increasing the requirements for high school graduation that we are going to produce a generation who has the knowledge and originality to build a better world in ways that humanity has not yet imagined.

I am aware that scientific rigor alone will not stop the Establishment from imposing its quick and simple solutions. But if all the teachers in America knew parts of only ten books by Piaget such as The Moral Judgment of the Child (Piaget, 1932), The Early Growth of Logic in the Child (Inhelder and Piaget, 1959), The Child's Conception of Time (Piaget, 1946), The Child's Conception of Geometry (Piaget, Inhelder, and Szeminska, 1948), and Understanding Causality (Piaget and Garcia, 1971), the Establishment could not get away with their ignorance any more.

Reform is obviously needed in teacher education and colleges of education, too. Although change is painfully slow in colleges of education, the fact is that not a single course is taught nowadays in educational psychology without some discussion of Piaget's theory. This is not bad considering that when I got my Ph.D. 20 years ago, I did not get even 5 minutes of graduate school devoted to Piaget's theory. The theory is usually badly taught today and misunderstood, but professors of education, too, must go through one level after another of being wrong.

I apologize for all the negative statements I made about the child-development philosophy, and would like to hear any disagreement anyone may want to express about what I said today. I honestly believe that educators must construct the next stage of our own profession from within if we are to stop being dictated by politicians and the public and by the old pendulum that keeps going back to what did not work before.

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